

# Agilent RDX Test Solutions for DigRF

N5343A DigRF Exerciser Module  
N5344A DigRF Analyzer Module

## Data Sheet

- Easily debug and integrate your DigRF based RF-IC and BB-IC components
- Experience insight from bit level to IQ modulated RF signals
- Quickly characterize your mobile handset design



# N5343A and N5344A Analyzer and Exerciser for DigRF

*Combine custom stimulus generation and real-time analysis to diagnose and characterize your system faster*



## Applications

- DigRF v4 link turn-on and debug
- RF-IC prototype turn-on and characterization
- BB-IC prototype turn-on and signal processing software development
- RF-IC and BB-IC integration and troubleshooting
- Automated test
- Robustness test with error injection

## Key features

- Real time DigRF stimulus and analysis
- Low intrusion probing solutions ensure DigRF measurement reliability
- Bit level to modulation level measurements for RF and digital design teams
- For RF-IC test, the exerciser simulates a BB-IC
- For BB-IC test, the exerciser simulates a RF-IC
- Allows multiple errors insertion
- Rich triggering support
- Based on modular, scalable platform

# N5343A and N5344A Analyzer and Exerciser for DigRF (Continued)

## Integration challenges

During the integration phase, it becomes challenging to find the root cause of interoperability issues, that may reside in the digital or RF domains. Digital and RF design teams need a common platform that provides insight in the domain of their choice.

Now you can get the capabilities you need with the Agilent RDX N5343A and N5344A DigRF test solution, providing protocol debug and enabling comprehensive cross-domain test for RF-IC and BB-IC developers and integration teams.

This solution includes a probing technology with minimum intrusion to maximize measurement reliability.

It utilizes Agilent's vector signal generation and analysis software, providing insight from bit level to complex IQ modulation level necessary to enable RF and digital engineers to quickly characterize RF-ICs and solve cross domain problems.

DigRF v4 is rapidly emerging as the next-generation serial interface between mobile baseband and RF chips. It is designed for use in high bandwidth mobile systems incorporating air interface standards such as LTE and WiMAX.

The DigRF standards present several new challenges for mobile wireless development, integration and validation teams as the communication link between the BB ICs and the RF-ICs evolve from analog to high speed serial digital.

One of the main challenges is that all components may not be available or ready during the tests. For example, the RF-IC needs to be tested without the BB-IC and vice versa.

To reproduce system problems or run regression tests, you often need to create traffic conditions that may be difficult to reproduce with real devices.

## RF design team challenge

Digital IQ data and control information are packetized and transferred between the BB-IC and the RF-IC over the DigRF interface.

Engineers traditionally use spectrum analyzers to perform modulation measurement from an analog IQ link between the BB-IC and the RF-IC, but need new tools to perform similar measurement on the DigRF digital serial interface.

To validate RF-IC operation before the start of the handset integration phase, engineering teams need DigRF digital serial stimulus and analysis tools that operate in concert with the traditional RF tools.

The challenges for BB-IC validation teams mirrors that of the RF-IC teams, as the signal sources and spectrum analyzers must be replaced by DigRF digital serial stimulus and analysis tools to validate BB-IC functionality.

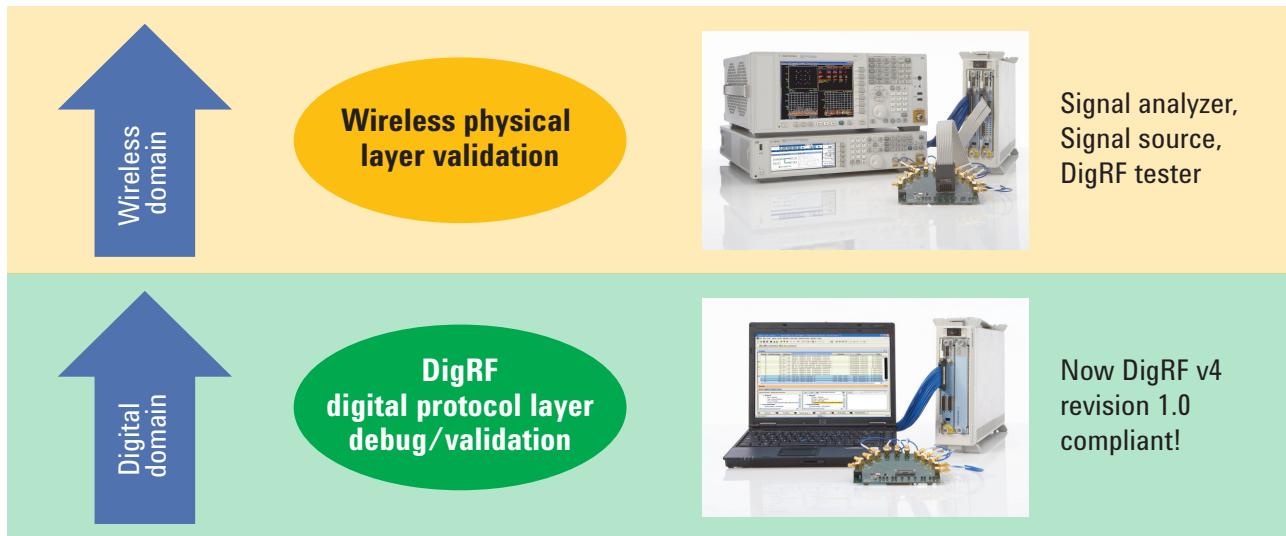
## Digital design team challenge

To ensure that your design operates according to the DigRF protocol specification, it is important to get insight on the DigRF link and protocol state machines and verify that the packet's structure are compliant with the standard, and to be able to detect error conditions.

## N5343A and N5344A Analyzer and Exerciser for DigRF (Continued)

A single platform for both digital and wireless design teams

The test solution allows engineers to work in the domain (Digital or RF) of their choice to quickly characterize the DUT's digital and wireless behavior and rapidly solve cross-domain integration problems.



### Product structure

The DigRF test solution consists of:

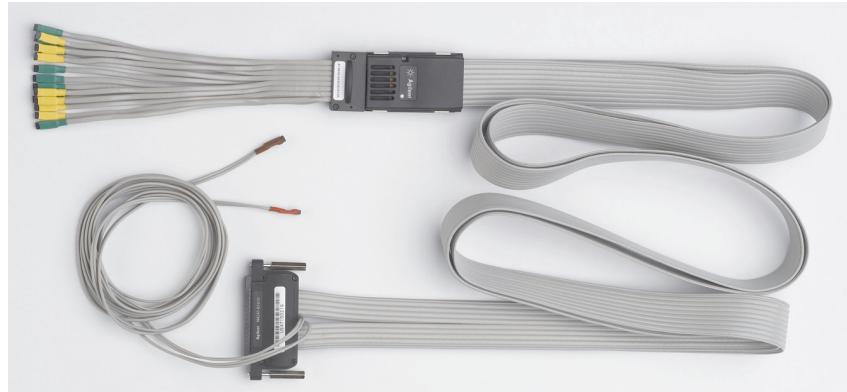
- Windows® XP based controller with host software
- N5302A 2-slot chassis or N5304A 4-slot chassis with LAN connection to host PC
- N5343A DigRF exerciser module
- N5344A DigRF analyzer module
- N5346A probing solutions

Both modules can be used separately or together for a high performance measurement solution.

## N5343A and N5344A Analyzer and Exerciser for DigRF (Continued)

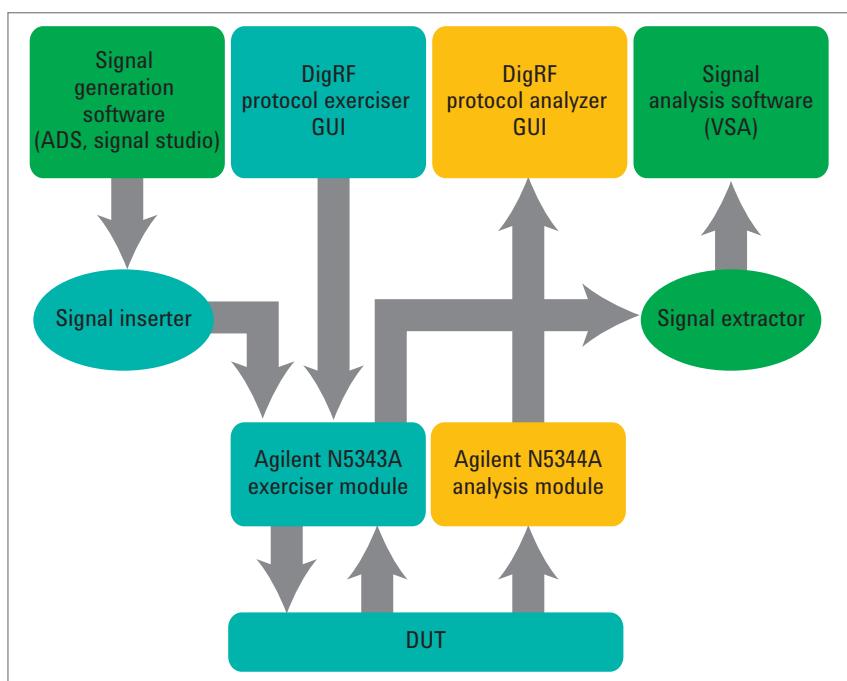
### Probing solutions

The N5344A analyzer module can be connected to the target system through a N5346A flying lead probe for signal access to space constrained devices.



### Software structure

The same hardware modules can be controlled through several user interfaces, providing protocol level stimulus and analysis and modulation level stimulus and analysis.



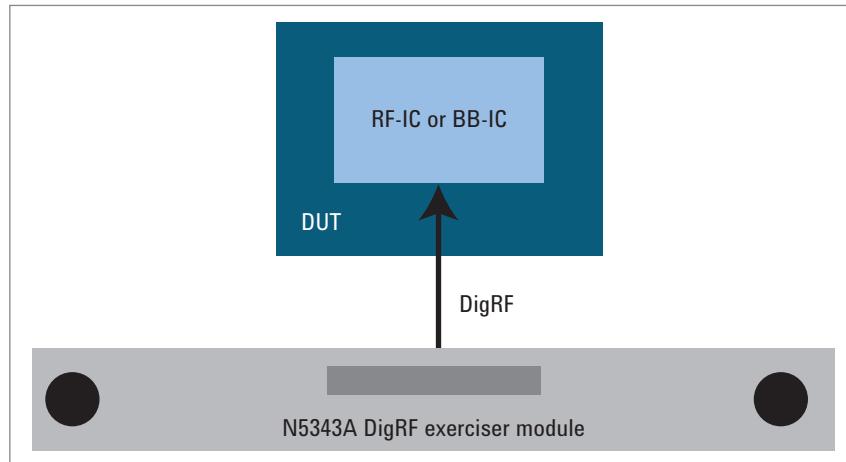
## Typical Test Configurations

### Active DigRF bus test configuration

In this configuration, the N5343A exerciser module emulates a DigRF device connected to the device under test.

It can emulate either a BB-IC or an RF-IC, depending of the nature of the device under test.

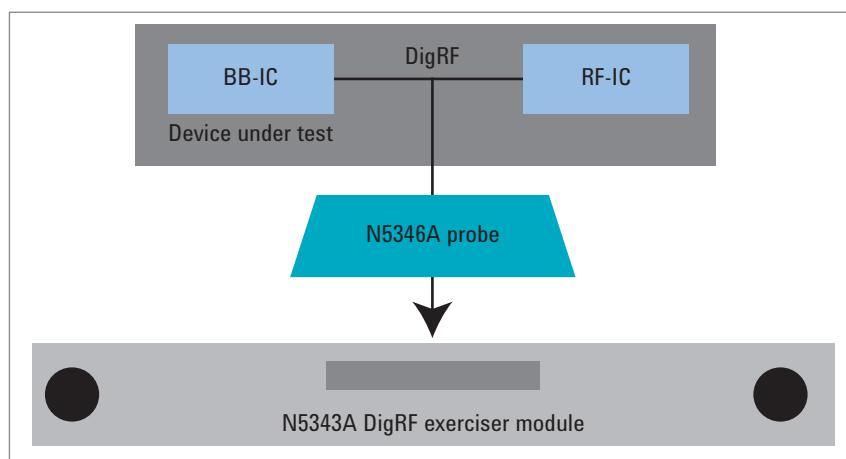
The N5343A can exercise a DigRF bus and monitor the response.



### Passive DigRF test configuration

In this configuration, the N5344A analyzer module transparently captures traffic between two devices.

This configuration is used during the integration phase to trouble shoot the link and solve cross domain issues.

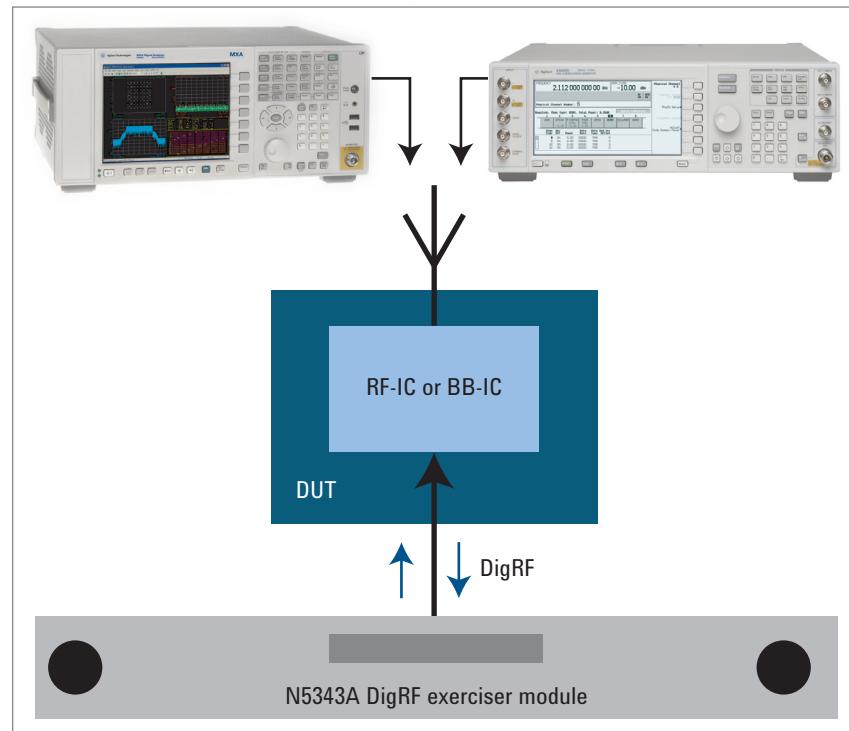


## Typical Test Configurations (Continued)

### RF-IC test configuration

In this configuration, the N5343A exerciser module is combined with an RF signal generator and an analyzer, to provide stimulus and analysis on the RF interface.

The same signal generation software and signal analysis software can be used to build stimulus and analyze data on both DigRF and antenna sides of the RF-IC.



## N5343A and N5344A Analyzer and Exerciser for DigRF

### *Use familiar software tools in both digital and wireless domains through the entire design cycle*

At any time, you can decide to work in the domain (digital or RF) and the abstraction level (physical or protocol) to quickly characterize the device under test and solve cross domain integration problems.

If you are a digital design engineer, the digital user interface provides you the features to stimulate the DigRF interface at the link and protocol layer, and observe the system behavior with full packet decoding capabilities.

If you are an RF design engineer, you will use the same familiar signal generation (Agilent Signal Studio or ADS) and analysis tools (Agilent VSA) with your signal analyzer, signal sources and DigRF analyzer/exerciser and get consistent measurements across both digital and analog interfaces of your RF-IC.

# Digital Domain User Interface

## Fully test your design's DigRF link and protocol interface

- Configurable DigRF traffic generation
- Customize header and payload, and frame sequence generation
- Repetitive and loop events
- Control and data traffic generation
- Low power and high speed mode control
- Error insertion to validate device's robustness and error recovery

## Hierarchical trace display speeds your debug process

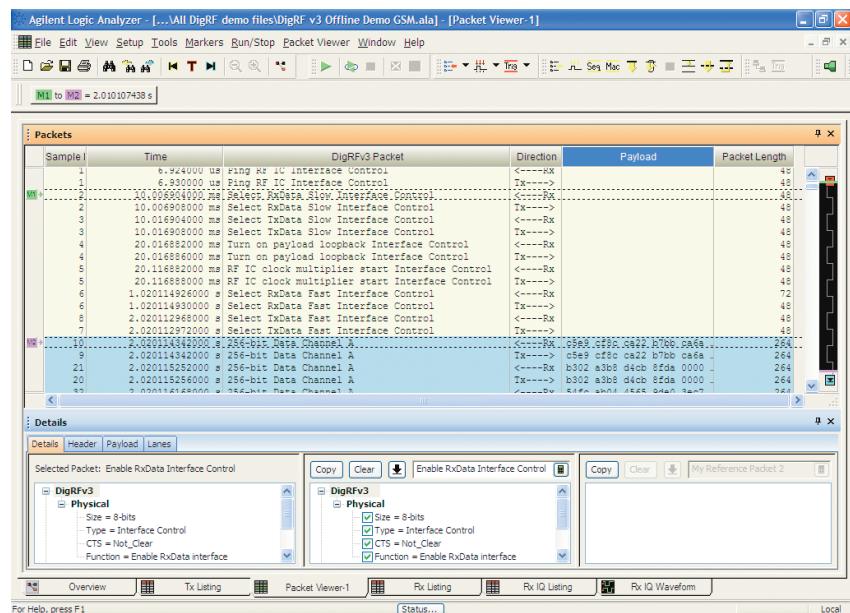
- Avoid constant scrolling with the hierarchical display that maximizes information density on the screen
- Full decoding capabilities
- Compare frames details and easily find bit-level differences
- Easily retrieve information with embedded markers
- Quickly find problems with automatic error detection and occurrence count

## Powerful triggering, easy setup

- Easy trigger setup by using and editing predefined patterns

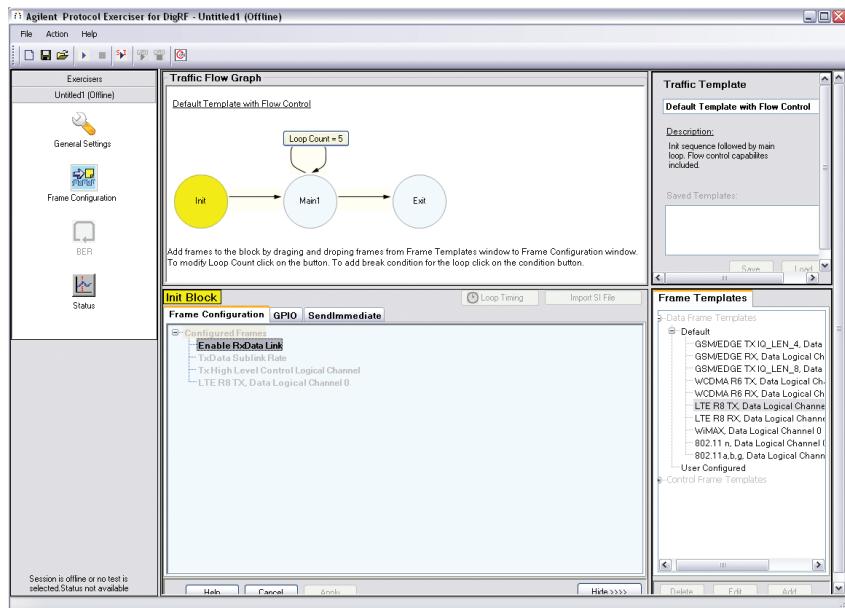
## Easy to use test wizard

- Step by step guide of the test procedure to take you through the test process
- Integration between the digital domain and wireless domains, with ability to import data from signal studio, or export captured packet into VSA

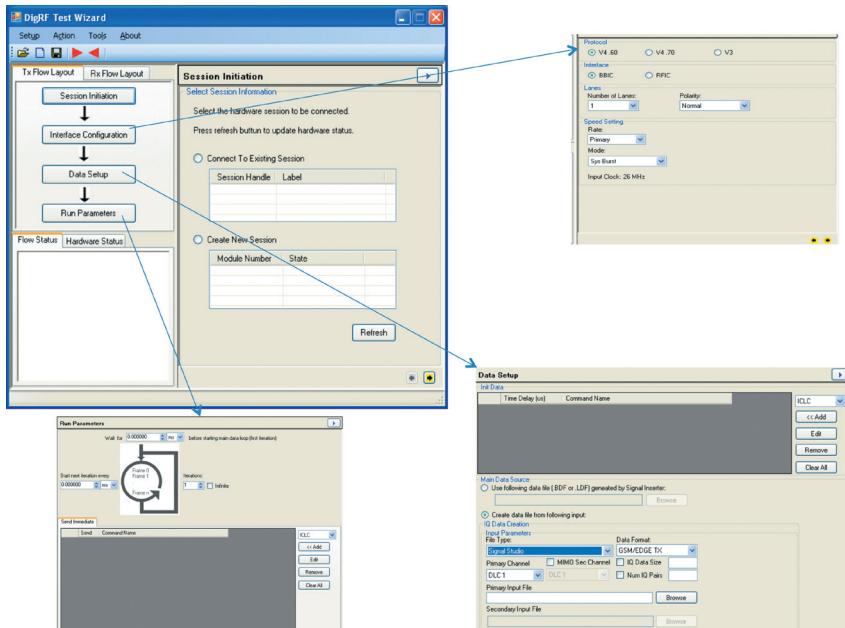


Packet view of DigRF traffic

## Digital Domain User Interface (Continued)



Easily configure traffic and insert errors



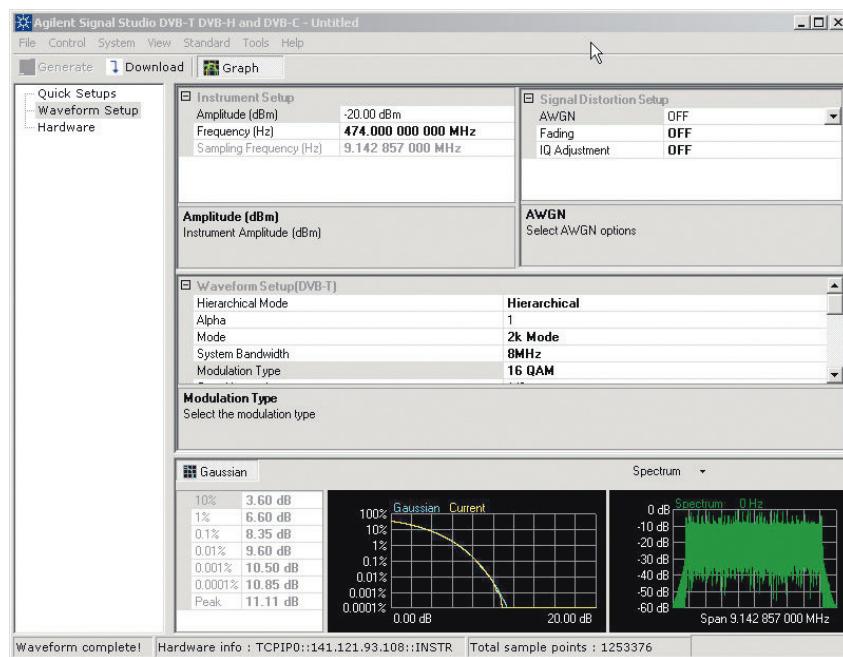
# Wireless Domain Software Tools

## Use familiar tools to create Digital IQ stimulus and easily embed it into DigRF traffic

Digital IQ data can be loaded into the exerciser from a variety of sources, including signal studio and Advanced Design System (ADS). The IQ data is encapsulated into DigRF-compliant packets.

The data packets are transferred to the device under test with the proper timing by the exerciser module.

Control packets, as specified by the user, can be inserted into the data packet flow while looping through the waveform. With this feature, you can make configuration adjustments – like the gain setting of the RF amplifiers – interactively.



## Use familiar tools to perform modulation measurement from received DigRF traffic

The N5344A acquisition module captures the traffic from the device under test. The data packets are identified and the digital IQ data is automatically extracted from these packets using the signal extractor tool. The digital IQ data is analyzed by the 89601A vector signal analysis tools running on the host controller. These capabilities enable RF-IC or BB-IC validation team to validate that the digital IQ was properly converted to DigRF format. In addition, the DSP algorithms that generated the IQ can be evaluated.



# Agilent N5343A Exerciser Module Features and Specifications

DigRF v4 specifications	
Connectors	SMA
Lanes	The exerciser supports a full line with two TX and two RX lines in high speed mode
Dedicated IO pins for v3 and v4	Yes
Performance specifications	
Line rate	26 Mbps/1248 Mbps/1456 Mbps
Sequencer control	
Loops	Yes
Conditional branches	Yes
Timer delay between packets	Yes
Error injection	Wrong CRC Wrong CRI Trigger in/Trigger out Disparity error Code error Wrong framing Missing ACK/NAK
GPIO bus	A 36 pin width GPIO bus can be used for stimulus of proprietary interface
Error counters	Number of CRI errors Number of CRC errors Number of frame length errors Number of received frames
Capture buffer	
Buffer size	Up to 512 Mb capture data buffer and 512 Mb generate data buffer
Trigger conditions	
Operating system	Windows XP Service Pack 3

# Agilent N5344A Analyzer Module Specifications

## The N5344A analyzer

General specifications	
Connectors	
Probe	Agilent flying leads (N5346A)
External RefClock output	SMA
DigRF v4 specifications	
Connectors	
Probe	Agilent flying leads (N5346A)
Trigger In/Out	Trigger analyzer from external source
	Trigger output from internal event
Lanes	The analyzer supports a full line with one TX and one RX lines
Dedicated IO pins for v4	Yes
Performance specifications	
Line rate	26 Mbps/1248 Mbps/1456 Mbps
SysClk speed	26 MHz
Trace depth	2 Gbyte
Triggering capabilities	
Pattern matcher	8
Errors detection	Invalid Sync Word
	Wrong CRC
Storage qualification	Yes
Analyzer capabilities	
Analyze both Tx and Rx	Yes
V4 protocol items	HS burst
	Sys burst
	TAS messages
	Nested frames
	ARQ/NAK
Displaying capabilities	
Protocol decode	All DigRF packets as defined by the specification 1.0
IQ data extraction	The analyzer is able to extract the IQ data from the DigRF data stream. The data can be viewed inside the protocol analyzer software with the waveform viewer. In addition, the IQ can be evaluated using the 89600 VSA software.
Operating system	
	Windows XP Service pack 3

# Agilent N5344A Analyzer Module Specifications (Continued)

Environment	
Module requirements	
Temperature (AT-ETM757)	Operating: 0 °C to +55 °C Storage: -40 °C to +70 °C
Humidity (AT-ETM758)	Operating: 15 to 95% Operating soak: 90% (24 h)
Safety standards	Installation category: EN ISO/IEC 17025, IEC 61010-1/EN61010-1, II Pollution degree: 2 Environmental rating: Standard
Chassis requirements	
Temperature (AT-ETM757)	Operating: 0 °C to +55 °C Storage: -40 °C to +70 °C
Humidity (AT-ETM758)	Operating: 15 to 95% Operating soak: 90% (24 h)
Safety standards	Installation category: EN ISO/IEC 17025, IEC 61010-1/EN61010-1, II Pollution degree: 2 Environmental rating: Standard
General characteristics	
Power requirements	100 to 120 Vac, 200 to 250 Vac 550 VA maximum 47 to 63 Hz
Physical characteristics	
2-slot chassis	Width: 30 cm (11.81 in) Depth: 49.0 cm (19.29 in) Height: 11 cm (4.33 in) Weight (empty): 5.1 kg (11.2 lbs)

# How to Configure a System

The recommended configuration consists of a Windows XP-based system controller (desktop PC or laptop) with one LAN 10/100 network card dedicated to the connection to one chassis containing at least one N5343A exerciser or N5344A analyzer module.

## System controller

The system controller is loaded with the software that provides a graphical interface to drive protocols and applications running on the test cards. The system controller must include a LAN card dedicated to the connection to the test chassis.

## Chassis

The chassis can be a 2-slot N2X chassis or 4-slot N2X chassis, connected to the system controller through a LAN interface.

## Test modules

The configuration may include a N5343A DigRF exerciser module, a N5344A DigRF analyzer module, or both.

The Agilent N5343A module is connected to the target system through SMA cables.

Each test module must be licensed to support the specific functionality for traffic generation or analysis.

The N5343A DigRF exerciser module can support DigRF v3 testing as well as DigRF v4 testing. When using the exerciser (N5343A), the exerciser can also be enabled to capture the received traffic using the capture license (Option V3A or Option V4A) for DigRFv3 and DigRFv4 license respectively.

The N5344A analyzer module only supports DigRFv4 capture. The V4A option must be purchased to enable this functionality. When used alone, the N5344A analyzer module requires a probing solution N5346A flying lead) for connection to the target system.

Agilent product number	Description
Chassis	
N5302A	2-slot, 2U high chassis
N5304A	4-slot, 2U high chassis
Test cards	
<b>N5343A</b>	<b>DigRF exerciser module</b>
Option V3E	DigRF v3 stimulus license
Option V3A	DigRF v3 capture license
Option V4E	DigRF v4 stimulus license
Option V4A	DigRF v4 capture license
Option DCE	Dual capture license
Option 001	Speed enhancement for direct IQ extraction
<b>N5344A</b>	<b>DigRF analyzer module</b>
Option V4A	DigRF v4 capture license
Option 2GM	Increase to 2 Gbyte memory for analyzer
Option 001	Speed enhancement for direct IQ extraction
Probes	
N5346A	Flying leads

## How to Configure a System (Continued)

### Software

Each module's license includes the digital interface software package. For example, the option V3E of the module N5343A includes the digital exerciser software.

The wireless software applications, such as VSA, signal studio or ADS software, must be ordered separately.

### Upgrades

Upgrade licenses can be purchased at any time to add additional functionality to your module.

Agilent product number	Description
Upgrade kits	
<b>N5343U</b>	<b>Upgrade kit for DigRF exerciser module</b>
Option V3E	DigRF v3 stimulus license
Option V3A	DigRF v3 capture license
Option V4E	DigRF v4 stimulus license
Option V4A	DigRF v4 capture license
Option DCE	Dual capture license
Option 001	Speed enhancement for direct IQ extraction
<b>N5344U</b>	<b>Upgrade kit for DigRF analyzer module</b>
Option V4A	DigRF v4 capture license
Option 2GM	Increase to 2 Gbyte memory for analyzer
Option 001	Speed enhancement for direct IQ extraction

### Related Agilent Literature

Publication title	Pub number
Digital Wireless (Dig RF) Brochure: Gain greater confidence in your DigRF designs	5989-9400EN



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